

## AMENDMENTS TO THE CLAIMS

1. *(Currently amended)* An proteorhodopsin gene isolated DNA molecule, comprising a nucleotide sequence encoding a proteorhodopsin protein with at least 78% amino acid identity to Sequence ID No:7, wherein from a naturally occurring marine gamma proteobacterium of Sequence ID No:1, said proteorhodopsin gene encoding a proteorhodopsin protein hasing a secondary structure of seven transmembrane α-helices that form a and a retinal binding pocket in which retinal is covalently linked.
- 10 2. *(Currently amended)* The isolated DNA molecule of claim 1, wherein said DNA molecule is isolated from a source selected from the group consisting A proteorhodopsin gene retrieved from a genomic fragment of a sample of naturally occurring bacteria, marine proteobacteria, gamma-proteobacteria, SAR86 bacteria, bacterioplankton extracts, recombinant DNA libraries containing derived from said naturally occurring bacteria, or bacterial artificial chromosome libraries containing derived from said naturally occurring bacteria, said proteorhodopsin gene encoding a proteorhodopsin protein having a secondary structure of seven transmembrane α-helices that form a pocket in which retinal is covalently linked.
- 20 3. *(Cancelled)*

4. *(Currently amended)* The isolated DNA molecule proteorhodopsin gene of claim 21, wherein said proteorhodopsin gene is nucleotide sequence comprises Sequence ID No:6 and said proteorhodopsin protein is Sequence ID No:7.

5 5. *(Currently amended)* The isolated DNA molecule proteorhodopsin gene of claim 37, wherein said proteorhodopsin-specific primers include three nucleotides encoding a non-native amino acid, creating a new restriction endonuclease site not present in the native sequence of said isolated DNA molecule proteorhodopsin gene, thereby allowing subcloning of said isolated DNA molecule proteorhodopsin gene in an 10 expression vector.

6. *(Currently amended)* The isolated DNA molecule proteorhodopsin gene of claim 41, wherein said bacterium is *E. Coli*.

15 7. *(Currently amended)* The isolated DNA molecule proteorhodopsin gene of claim 12, wherein said nucleotide sequence comprises genomic fragment is retrieved from a clone BAC31A8, said proteorhodopsin gene is Sequence ID No:4 and said proteorhodopsin protein is Sequence ID No:5.

20 8-36. *(Withdrawn)*

37. *(Currently amended)* The isolated DNA molecule proteorhodopsin gene of claim 1 or 2, wherein said DNA molecule is isolated amplified from said genomic fragment by polymerase chain reaction utilizing proteorhodopsin-specific primers.

38. *(Currently amended)* The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 37, wherein said proteorhodopsin-specific primers comprise Sequence ID No:2 and Sequence ID No:3.

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39. *(Currently amended)* The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 5, wherein said expression vector containing said isolated DNA molecule ~~proteorhodopsin gene~~ expresses said proteorhodopsin protein in a host.

10 40. *(Currently amended)* The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 39, wherein said host is an artificial membrane system.

41. *(Currently amended)* The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 39, wherein said host is a bacterium.

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42. *(Currently amended)* The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 41, wherein said host is a cell membrane preparation of said bacterium.

20 43. *(Currently amended)* The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 39, wherein said host is an eukaryote.

44. *(Currently amended)* The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 43, wherein said host is a cell membrane preparation of said eukaryote.

25 Clams 45-129 (*Cancelled*).